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*Armed Forces Medical  
Intelligence Center*

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# **Infectious Disease Threats**

**Dr. Kathryn Clark**



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# **Infectious Disease Threats**

- ❖ **Risk assessment methodology  
update**
- ❖ **GIS analytic initiatives**
- ❖ **Emerging disease threats**



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# **Global Intelligence Mission**

## **❖ Force health protection for deployed personnel**

- Forecasts/warning for disease outbreaks
- Foreign disease baseline health risk assessments
- Humanitarian health issues

## **❖ Counterproliferation baseline**

- Natural distribution of potential BW agents

## **❖ National security & homeland defense**

- Global impact of HIV/AIDS & emerging diseases
- Introduction or accidental importation of disease



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# Disease Outbreak Monitoring

### Event Description

### Analyst's assessment

- ❖ Disease type (strain)
- ❖ Location (geo-coordinates)
- ❖ # Cases (suspect/confirmed)
- ❖ Country response (if any)

- ❖ Assess source information
- ❖ Estimate risk to deployed force
- ❖ Forecast potential for outbreak

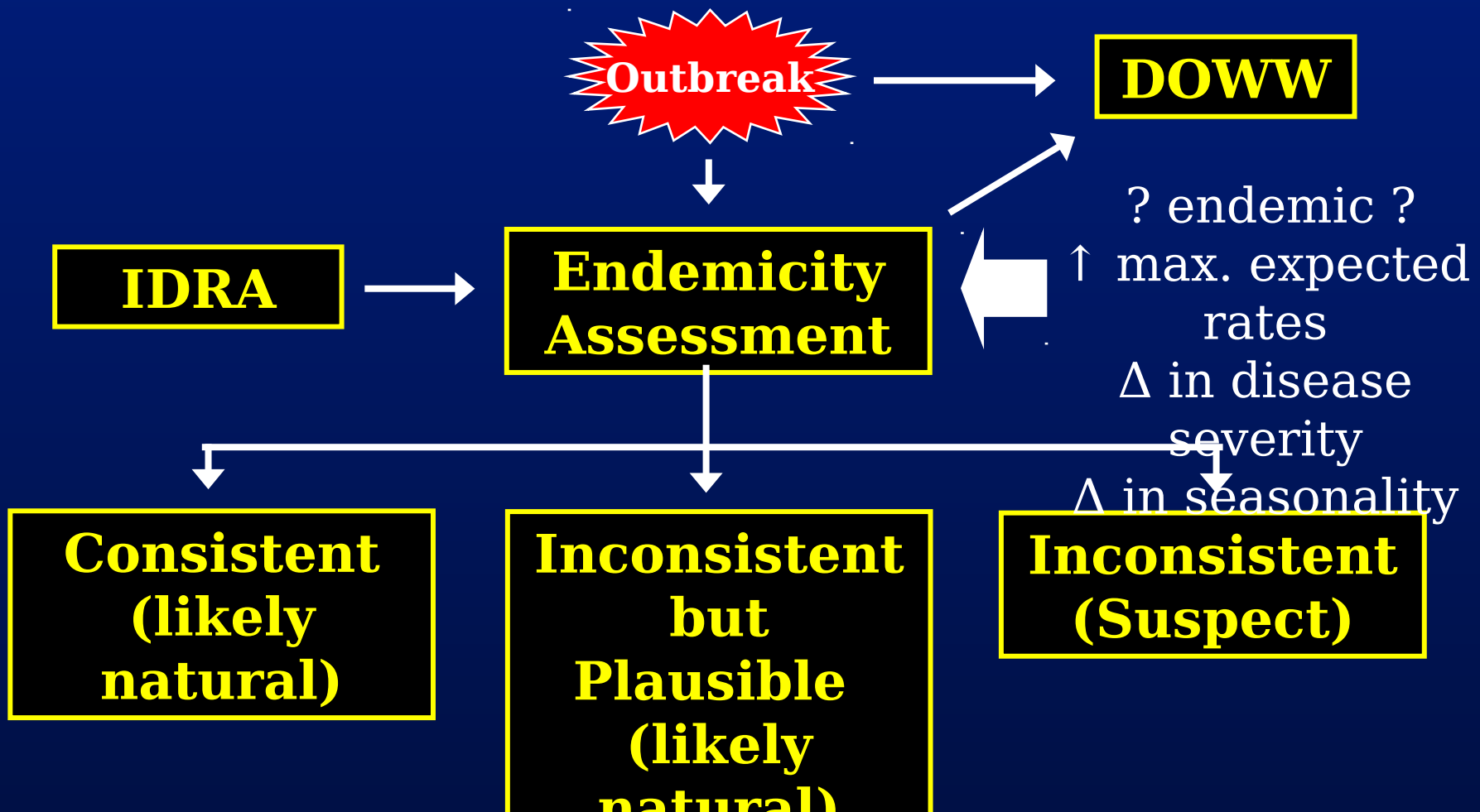
**Disease Occurrence Worldwide -- rapid assessment & notification to operational customers**

Collaborate on assessing potential intentional release



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# Current Process for Assessing Outbreaks of BW Potential





# *Armed Forces Medical* **Country-specific** **Infectious Disease Risk** **Assessments**

- ❖ What percentage of personnel are likely to be affected by a disease?
- ❖ How many days will likely be lost per case?

**Expression of Operational Impact  
for Pre-deployment Planning**



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# **Diseases Assessed for Country-specific Risk**

- ❖ **Anthrax**
- ❖ **Argentinian hemorrhagic fever (Junin)**
- ❖ **Bartonellosis (Oroya fever)**
- ❖ **Bolivian hemorrhagic fever (Machupo)**
- ❖ **Brucellosis**
- ❖ **California group viruses**
- ❖ **Chikungunya**
- ❖ **Crimean-Congo hemorrhagic fever**
- ❖ **Dengue fever**
- ❖ **Diarrhea - bacterial**
- ❖ **Diarrhea - cholera**
- ❖ **Diarrhea - protozoal**
- ❖ **Eastern equine encephalitis**
- ❖ **Ebola hemorrhagic fever**
- ❖ **Gonorrhea / chlamydia**
- ❖ **HIV/AIDS**
- ❖ **Hantavirus hemorrhagic fever with renal syndrome (HFRS)**
- ❖ **Hantavirus pulmonary syndrome**
- ❖ **Hepatitis A**
- ❖ **Hepatitis B**
- ❖ **Hepatitis E**
- ❖ **Japanese encephalitis**
- ❖ **Kyasanur Forest disease**
- ❖ **Lassa fever**
- ❖ **Leishmaniasis - cutaneous and mucosal**
- ❖ **Leishmaniasis - visceral**
- ❖ **Leptospirosis**
- ❖ **Lyme disease**
- ❖ **Malaria**
- ❖ **Marburg hemorrhagic fever**



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# **Diseases Assessed for Country-specific Risk**

- ❖ **Mayaro virus**
- ❖ **Meningococcal meningitis**
- ❖ **Murray Valley (Australian) encephalitis**
- ❖ **Omsk hemorrhagic fever**
- ❖ **Onyong-nyong**
- ❖ **Oropouche virus**
- ❖ **Plague**
- ❖ **Q fever**
- ❖ **Rabies**
- ❖ **Rift Valley fever**
- ❖ **Ross River virus**
- ❖ **Sand fly fever**
- ❖ **Schistosomiasis**
- ❖ **Sindbis (Ockelbo) virus**
- ❖ **Spotted fever group (tickborne rickettsioses)**
- ❖ **St. Louis encephalitis**
- ❖ **Tick-borne encephalitis (TBE)**
- ❖ **Trypanosomiasis - American (Chagas disease)**
- ❖ **Trypanosomiasis - Gambiense (African)**
- ❖ **Trypanosomiasis - Rhodesiense (African)**
- ❖ **Tuberculosis**
- ❖ **Tularemia**
- ❖ **Typhoid / paratyphoid fever**
- ❖ **Typhus - miteborne (scrub typhus)**
- ❖ **Typhus - murine (fleaborne)**
- ❖ **Venezuelan equine encephalitis**
- ❖ **Venezuelan hemorrhagic fever (Guanarito)**
- ❖ **West Nile fever**
- ❖ **Yellow fever**





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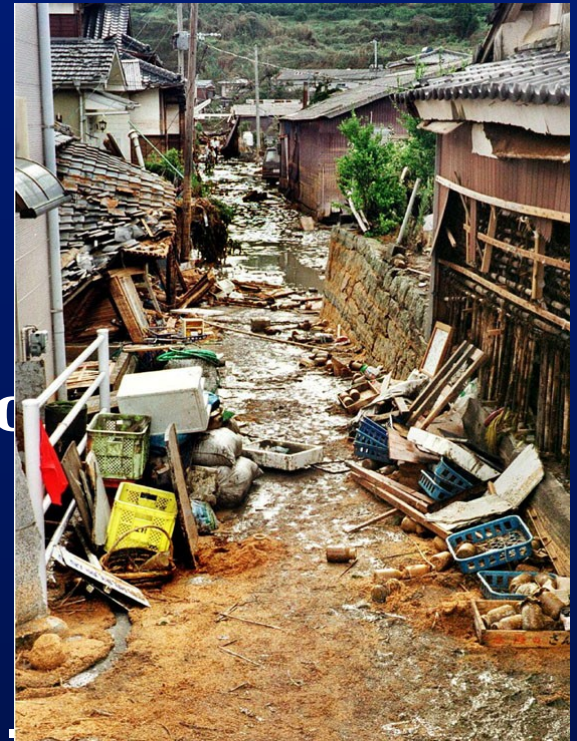
# **Underlying Assumptions *Infectious Disease Risk Assessments***

## ❖ **Healthy US military force**

- **No immunity to most tropical diseases**

## ❖ **Field conditions**

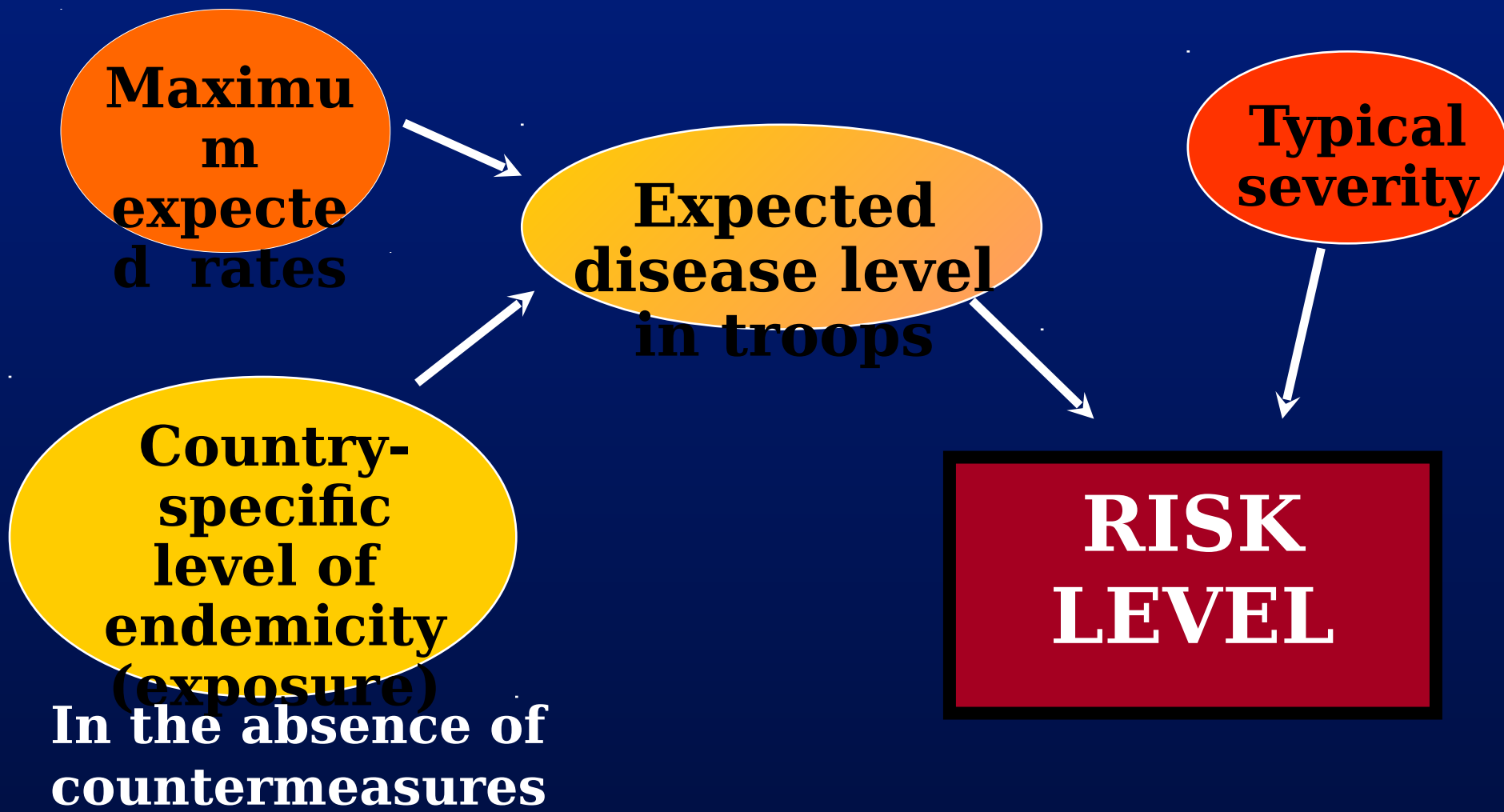
- **Tents, crowding, field sanitation**
- **Exposure to vectors**
- **Access to local economy**
- **Minimal prolonged household type contacts with local population**





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# **Risk Analysis Framework**





# *Armed Forces Medical Intelligence Center* **Maximum Expected Disease Rates**

Order of Magnitude Approximation

Rare

Per month

Less than 1%

Potentially 1-10%

Potentially 11- 50%

Potentially > 50%



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# **Intelligence Considered in Estimating Region-Specific Risk**

- ❖ **History of outbreaks & natural epidemiology**
- ❖ **Prevalence and incidence rates: human, reservoir, and vector**
- ❖ **Age-specific rates/ratios**
- ❖ **Regional data**
- ❖ **Proxy data**



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# Typical Disease Severity

### ❖ **Mild**

- Less than 72 hrs quarters restriction or limited duty

### ❖ **Moderate**

- 1-7 days inpatient care, return to duty

### ❖ **Severe**

- Greater than 7 days hospitalization or convalescence

### ❖ **Very severe**

- ICU required, permanent disability or mortality



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## **Prioritized Risk**

### ❖ **High risk**

- Affects large percentage of personnel, or causes severe illness in a smaller percentage

### ❖ **Intermediate risk**

- Generally affects smaller numbers of personnel, or causes mild symptoms

### ❖ **Low risk**

- Likely to have a minimal impact on operational readiness

### ❖ **No significant risk**



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# Putting it together: Malaria in Liberia

**M.E.R.  
11-50%  
per  
month**

**Expected  
disease level  
in troops  
11-50% per  
month**

**Typical  
severity  
Severe**

**Level of  
endemicity  
in Liberia:  
High**

**RISK  
LEVEL**

**In the absence of  
countermeasures**

**High Risk**



# *Armed Forces Medical Intelligence Center* **Putting it together: Malaria in Iraq**

**Max  
Rate  
11-50%  
per  
month**

**Level of  
malaria in  
Iraq:  
Sporadic**

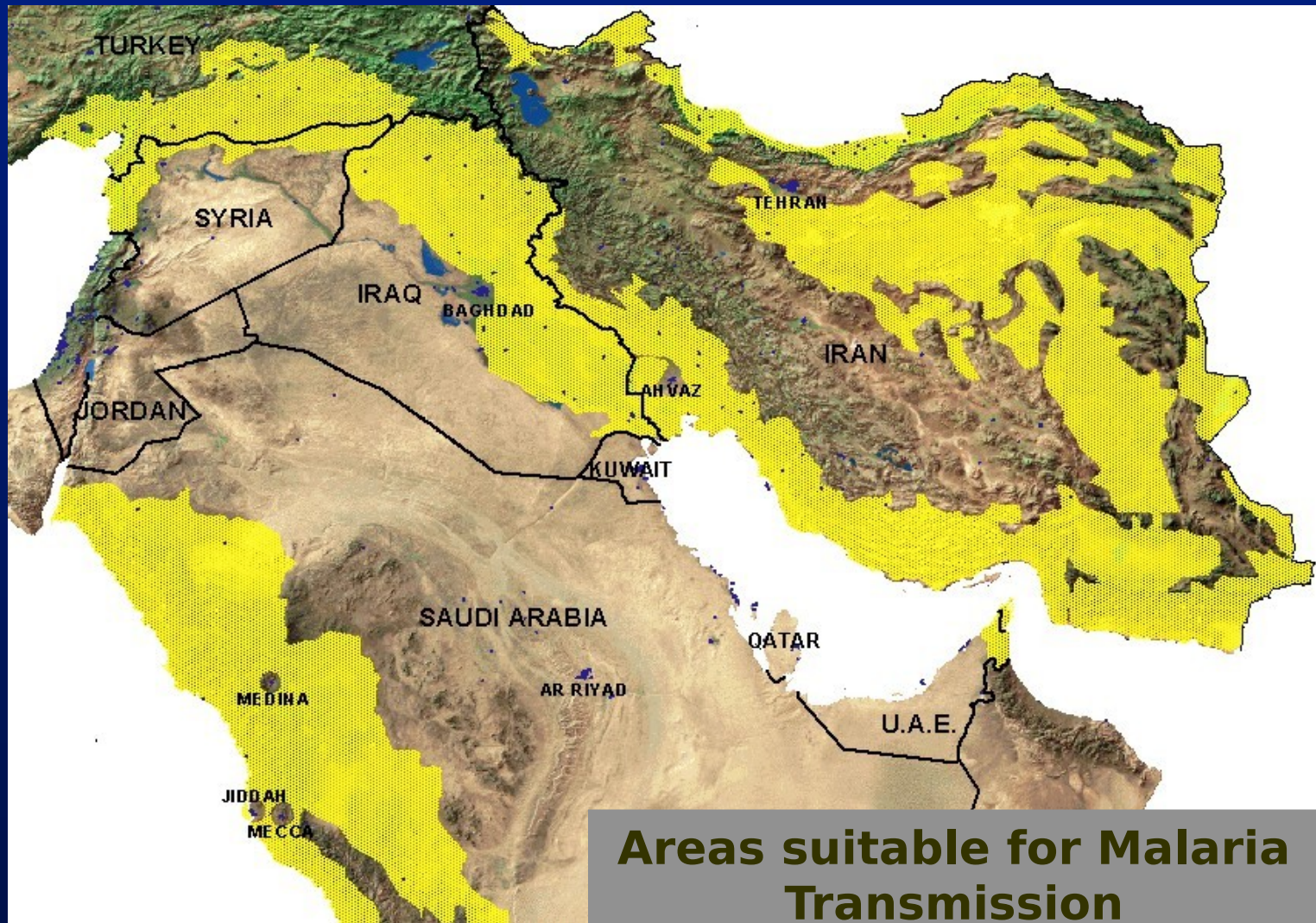
**Expected  
disease level  
in troops:  
rare cases  
could occur**

**Typical  
severity  
Moderate**

**RISK  
LEVEL  
Low Risk**



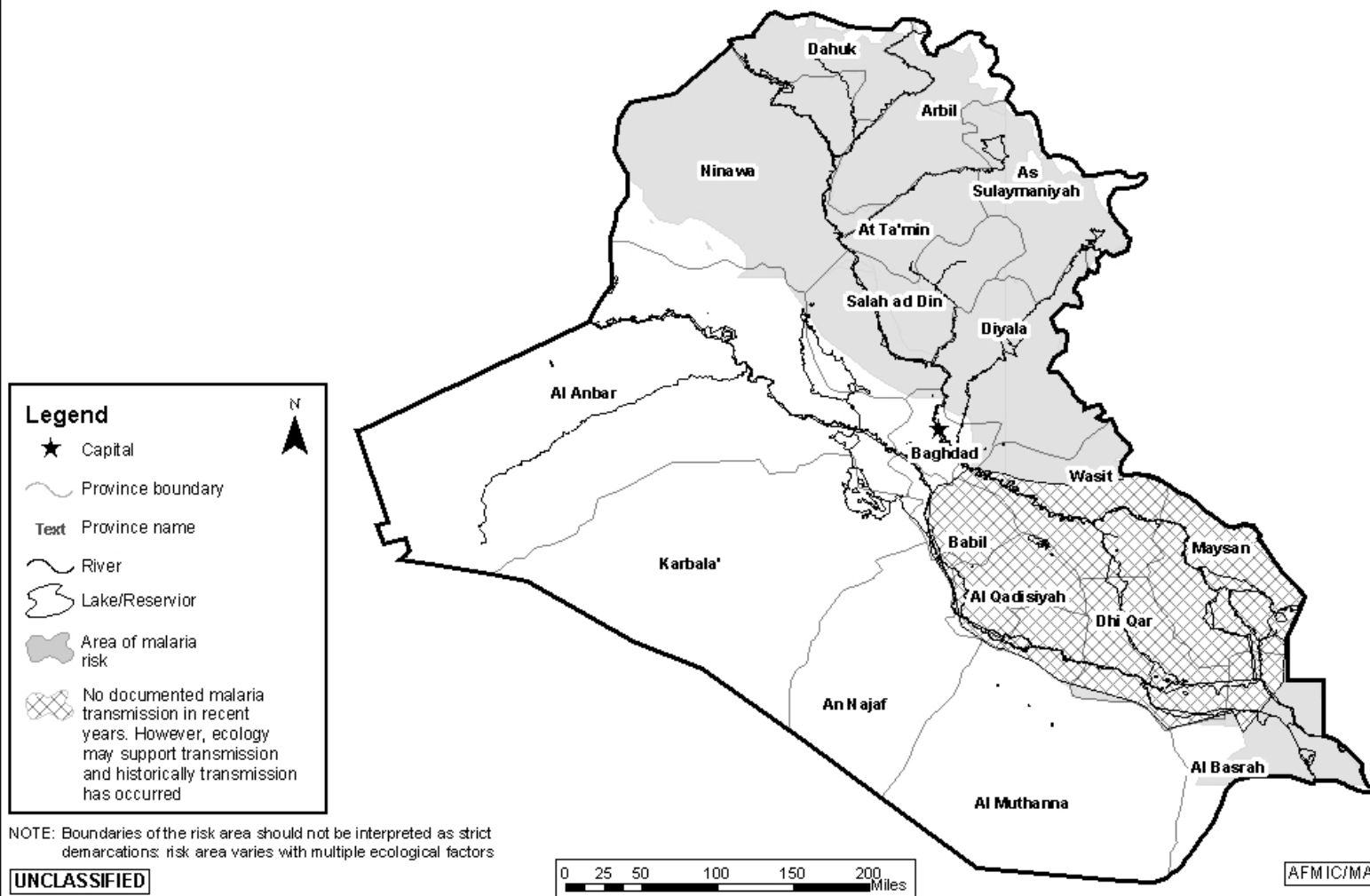
# Assessing Geographic Risk Distribution





UNCLASSIFIED

## Malaria Distribution in Iraq





# *Armed Forces Medical* **USCENTCOM Malaria** *Intelligence Center* **Guidance**

<b>Country</b>	<b>AFMIC risk level (no countermeasures)</b>	<b>USCENTCOM chemoprophylaxis recommendation</b>
<b>Afghanistan</b>	<b>Potentially 1-10% per month</b>	<b>Recommended unless circumstances mitigate risk</b>
<b>Iraq</b>	<b>Rare cases</b>	<b>Recommended unless circumstances mitigate risk</b>
<b>Iran</b>	<b>Rare cases</b>	<b>Recommended unless circumstances mitigate risk</b>
<b>UAE</b>	<b>Very limited risk</b>	<b>Not recommended by USCENTCOM</b>



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# **Emerging Threats**

- ❖ **Multiple, rapid deployments**
- ❖ **New deployment risk areas poorly characterized**
- ❖ **Coalition partners not well prepared**
- ❖ **Continued mismatch between risk and perception**



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# **Multiple deployments**

- ❖ **Increase exposures -- higher risk**
- ❖ **Complicate diagnosis**
  - **Travel history may not be known or elicited**
  - **Vague symptoms and/or long incubation periods**
- ❖ **Examples:**
  - ***Q fever* -- 6 cases in 101<sup>st</sup> Airborne after consecutive deployments to Afghanistan & Iraq**
  - ***Leishmaniasis* - over 500 cases, with infections still being identified from 2003 (long incubation)**





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## **New Deployment Areas**

### *Central Asia & Caucasus*

#### ❖ **Minimal lab capacity**

- **Pathogens not well assessed**
- **New pathogens likely missed**

#### ❖ **Prior Soviet training**

- **Limited CE opportunities**
- **Emphasis on hospitalization**





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# New Coalition Partners

- ❖ Preventive medicine capability
  - Minimal pre-deployment intel
  - Countermeasures/doctrine frequently lacking
- ❖ Eastern Europeans
  - Leishmaniasis in Middle East
  - Malaria in Africa





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# **Risk - Perception Mismatch**

- ❖ **Malaria in US forces in Liberia**
  - Adequate pre-deployment intelligence
  - Lack of countermeasure enforcement/compliance
  
- ❖ **Risk of combat-related HIV/AIDS infections**
  - Assessed as low for wound-related exposures in Iraq
  - Unknown, but likely low from intentional use of contaminated munitions or infected humans





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# **Infectious Disease Threat Summary**

- ❖ **AFMIC analytic initiatives:**
  - **Improved sensitivity & specificity of assessments**
  - **Real-time assessment of outbreaks & disease risk**
  - **Customer feedback & rapid dissemination**
- ❖ **Protecting deployed forces & improving readiness**